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The Deepwater Project—
A Sea of Change for the U.S. Coast Guard

INTRODUCTION

As the largest and most innovative acquisition effort ever undertaken by the U.S. Coast Guard, the Deepwater Project is delivering the tools the men and women of the 21st Century Coast Guard need to stand an effective and efficient watch on the frontline of America's safety and security.

THE DEEPWATER PROJECT

The Deepwater Project approach is truly unique in all of the federal government. Traditionally, major acquisition projects are focused on purchasing a single type of asset or specific kind of service. For example, a Navy project may acquire a new class of ship, an Air Force project a new type of aircraft, or an Army project a new armored vehicle. And if more than one new asset or service is needed, the agency charters separate projects for each.

With the Deepwater Project however, the Coast Guard breaks the traditional federal acquisition paradigm and implements an innovative Mission-Based Performance Acquisition approach. Rather than focusing on specific hardware, like a class of cutter or aircraft, the Coast Guard has developed a performance specification that describes the fundamental capabilities the service needs to perform all of its missions in the deepwater regions worldwide.

The Coast Guard categorizes its operating environment into three regions— inland, coastal, and deepwater. Deepwater is defined as the region extending 50 miles or more offshore, or situations/missions requiring extended on scene presence, or long distances to reach the operating area. Within the deepwater regions, the Coast Guard is mandated by statute to perform fourteen operational missions (See Table 1).

TABLE 1

Deepwater Missions

The Coast Guard has 14 legislatively mandated missions to perform in Deepwater regions world-wide that comprise these four major mission areas:

- Maritime Safety—Search and Rescue; International Ice Patrol
- Maritime Law Enforcement—Drug Interdiction; General Enforcement of Laws and Treaties; Alien Migrant Interdiction; Living Marine Resource Enforcement
- Marine Environmental Protection—Maritime Pollution Enforcement; Lightering Zone Enforcement; Foreign Vessel Enforcement
- National Defense—General Defense Operations; Maritime Interception Operations; Environmental Defense Operations; Deployed Port Operations, Security & Defense; Peacetime Military Engagement

The overwhelming benefit of the Mission-Based Performance Acquisition approach is that industry is empowered with tremendous flexibility to leverage proven technologies and new processes to maximize the Coast Guard's deepwater operational effectiveness at the minimum total ownership cost.

The Project's scope includes the entire range of Coast Guard deepwater assets — cutters, aircraft, sensors, communications, and logistics (See Table 2). The Coast Guard seeks to replace and or modernize these assets in order to gain the capabilities to effectively and efficiently perform its deepwater missions. The Project's encompassing scope affords industry vast trade space to develop the optimum type and mix of assets to comprise their proposed Integrated Deepwater System.

Another key benefit of Deepwater's "system of systems" approach is the focus on interoperability between assets. As depicted in Figure 1, designing specific deepwater assets as components of an overall Integrated Deepwater System builds in interoperability right from the start. Cohesive interoperability ensures seamless performance of missions by multiple assets and produces an overall force multiplier effect for the Coast Guard's deepwater fleet.

FIGURE 1. Deepwater Philosophy

ALWAYS READY?

While the Coast Guard stands "Semper Paratus," always ready to face the many challenges of its deepwater missions, the greatest threat confronting the Coast Guard is that its deepwater cutters and aircraft are aging and technologically obsolete. As a result, these platforms have increasing operating and maintenance costs, lack essential capabilities in speed, sensors, and interoperability, and consequently hinder the overall performance of the Coast Guard in the deepwater regions.

Block Obsolescence

Seven of the Coast Guard's nine classes of deepwater ships and aircraft reach the end of their planned service life in the next fifteen years. The average age of the Coast Guard's high and medium endurance cutters is 27 years. Moreover, the overall Coast Guard deepwater cutter fleet is older than 38 of the world's 42 major naval fleets.

Capability Gap

Existing Coast Guard deepwater assets lack fundamental capabilities necessary for efficient and effective mission performance. For example, most cutters lack the sensors and speed necessary to detect and intercept smuggler "go fast" boats. The HH-60J medium range helicopter is too large to safely deploy on all but a few cutters. And perhaps most restricting in today's information age is that deployed cutters and aircraft have limited ability to share tactical information and lack real-time or near real-time access to essential operational databases.

TABLE 2

Deepwater Assets

The Deepwater Project encompasses the replacement and/or modernization of all of these current Coast Guard assets:

Qty.	Cutter Type	Qty.	Aircraft Type
12	378’ High Endurance Cutters	95	HH-65A Helicopters
13	270’ Medium Endurance Cutters	42	HH-60J Helicopters
16	210’ Medium Endurance Cutters	30	HC-130H Airplanes
3	Mature Medium Endurance Cutters	23	HU-25 Airplanes
49	110’ Patrol Boats	190	Total Aircraft
93	Total Cutters		

Technology Gap

A consequence of operating aged assets is the limitations resulting from the old and in many cases obsolete technology inherent in those assets. In addition to hindering operational performance, antiquated technology ultimately increases operating and maintenance costs. A compelling indicator is that personnel costs account for approximately two thirds of the operating costs of a major deepwater cutter.

In the thirty years since most of the deepwater cutters were designed, great strides have been made in automating shipboard systems and minimizing maintenance. Consequently, some foreign navies operate vessels of comparable size with half or even a third of the crew complement. Another factor to consider is antiquated sensors. The poor capability to detect and identify targets results in more time spent “looking” and less time actually prosecuting missions.

Logistics Demands Increasing

As Coast Guard deepwater assets continue to age, they place greater demands on the logistics infrastructure. Many system or component manufacturers have or will soon cancel production and support for old equipment and parts. For example, the main engines on the 210’ class of cutters are only used by the Coast Guard and a South African railroad—the manufacturer has long since ceased production and support. Similarly, the gas turbine engines on the 378’ cutter class are no longer in production and support is dwindling. As a result of maintenance challenges like these, the overall logistics effort demands more labor hours and increased maintenance costs, while cutter and aircraft operational availability decrease.

PROJECT ACQUISITION STRATEGY

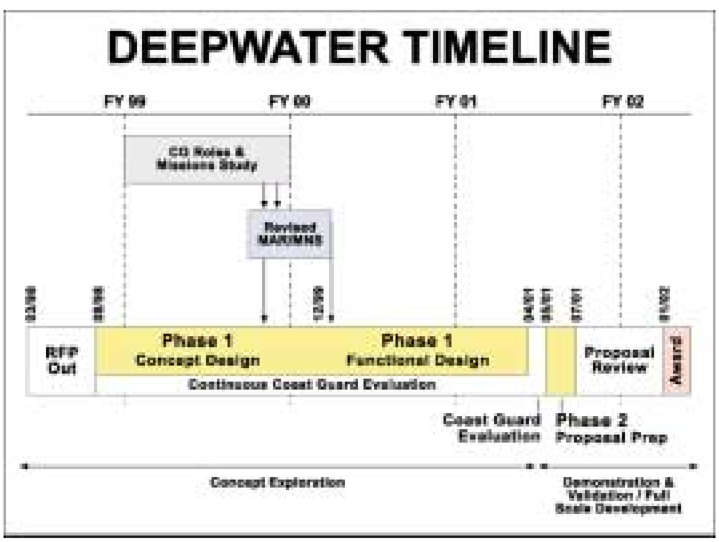

FIGURE 3. Deepwater Project Schedule

Deepwater's acquisition strategy is patterned after the successful DoD model of contracting for competing industry teams with eventual down selection to a substantial contract award. The benefits of this approach are that industry is motivated to cost-share system development, competition encourages innovation and fair pricing, and collaborative teaming between government and industry reduces overall project risk. The end result is a contract award that ultimately yields the best value for the government.

As shown in Figure 3, the Project is currently in Phase 1 Conceptual Design. During this phase of the project, participating industry teams conceive and engineer their proposed integrated Deepwater system concepts to approximately 50 percent design complete. Phase 1 began in August 1998 with the award of Conceptual Design contracts to three industry teams—Lockheed Martin, Avon-dale Industries, Inc., and Science Applications International Corporation (SAIC) serving as prime contractors. Table 3 provides a complete list of Deepwater industry team participants.

After Conceptual Design, the Coast Guard can continue any or all of the participating teams into Functional Design. During Functional Design, the selected teams essentially continue to evolve and refine their Integrated Deepwater System concepts to approximately 80 percent design complete.

As noted on the Project schedule, an independent Coast Guard Roles and Missions Study is presently underway. This group is examining and may recommend changes to the current slate of overall Coast Guard responsibilities. The findings from this study will be incorporated into the Project as well as into industry's Integrated Deepwater System designs.

TABLE 3

Description of Deepwater Industry Teams

Avondale Industries, Inc.
Newport News Shipbuilding
Boeing-McDonnell Douglas Corporation
John I. McMullen & Associates, Inc.
DAI, Inc.
Raytheon Systems Company

Science Applications International Corporation
Marinette Marine Corporation
Sikorsky Aircraft Corporation
Soza & Company, Ltd.
Bath Iron Works
CTM Automated Systems
AMSEC
Fuentez Systems Concepts, Inc.
Gibbs & Cox, Inc.
Interactive Television Corporation
Clark Atlanta University

Lockheed Martin Government Electronic Systems
Ingalls Shipbuilding, Litton PRC, M. Rosenblatt & Son, Sperry Marine, Inc., Litton Data Systems, University of New Orleans
Halter Marine
Bollinger Shipyards Inc.
Bell Helicopter Textron
Lockheed Martin Information Systems
Lockheed Martin Radar & Surveillance Systems
Lockheed Martin Sanders

Lockheed Martin Aeronautical Systems
Lockheed Martin Federal Systems
Lockheed Martin Mgmt and Data Systems
LOGICON Syscon
L-3 Communications, Inc.
PROSOFT

The commencement of Phase 2 marks another competitive decision point. The Coast Guard may continue up to three teams to develop their Phase 2 proposals for actual construction of their Integrated Deepwater System concept. The final award decision to one team for the construction and implementation of the Coast Guard's Integrated Deepwater System is scheduled for January 2002.

In addition to Deepwater's industry teams, the Coast Guard hired the Center for Naval Analyses to serve as the Independent Analysis Government Contractor (IAGC). Essentially, the IAGC serves as check and balance in the Deepwater design process. The IAGC will perform an independent Deepwater Phase 1 Concept Design that offers the Coast Guard a baseline assessment of the technologies and platforms relevant to Deepwater. In addition, the IAGC will perform a sensitivity analysis of Deepwater system costs. Among other factors, the analysis will consider the impact of procuring an Integrated Deepwater System at a various annual funding levels and over varying periods of time.

The IAGC's cost analysis implements advice, provided by the General Accounting Office (GAO) in their October 1998 Deepwater report, that unplanned procurement extensions "ultimately drives up costs because of such factors as higher administrative costs and the loss of quantity discounts." The results of the cost sensitivity analysis will he used to establish realistic Deepwater funding profiles and budget targets.

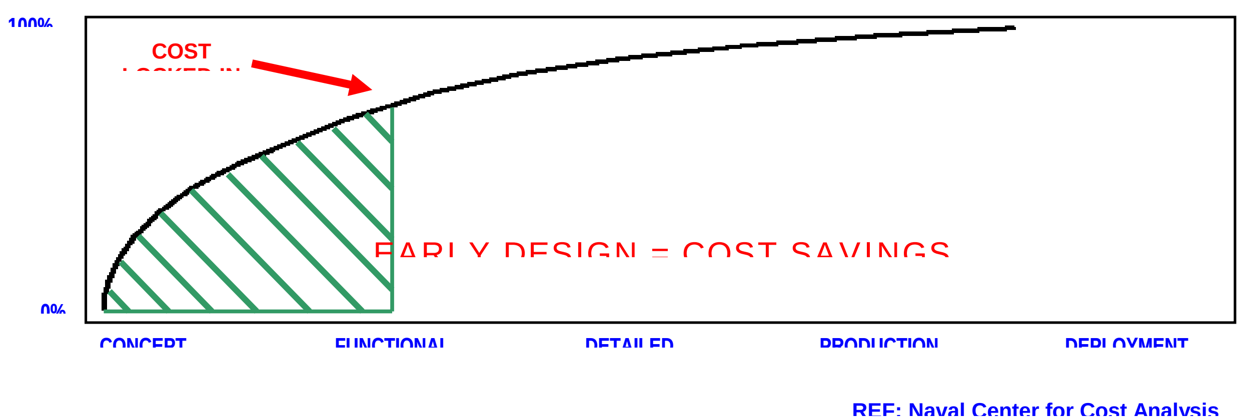

FIGURE 4. Major System Development Cycle

The Coast Guard is currently in a critical stage of the Deepwater Project. As illustrated in Figure 4, the vast majority of the costs and capability of a proposed Integrated Deepwater System are locked-in during early Conceptual and Functional Design efforts. During this stage fundamental technical and cost risks are identified and mitigated. Trade-off studies are performed, early operational assessments and technical demonstrations are conducted to validate operational suitability and mitigate technical risk in system/subsystems. Bottoms—up cost estimates are developed to support reliable acquisition and life cycle cost estimates. *Essentially, the analysis and decisions made in Conceptual and Functional Design drive the fundamental cost and capabilities of the Integrated Deepwater System the Coast Guard will operate for the next forty years.*

DRAMATIC CHANGE AHEAD

Because of the technology and capability limitations cited earlier, the Coast Guard greatly lags its Navy counterparts in implementing a modem network-centric operational philosophy. In a Navy task force, all participating units are connected via data links to automatically share tactical information. This seamless interconnectivity enables comprehensive situational awareness and coordinated target engagement.

The Coast Guard, however, lacks the necessary equipment to implement a robust network-centric approach. Although the service practices the task force strategy, the limited data link capability on its major cutters and complete lack of this capability on its smaller ones and aircraft make coordinated task force operations less responsive and very labor intensive.

The more common Coast Guard operational strategy is the platform-centric approach. Cutters and aircraft independently patrol and prosecute missions that arise in their respective geographic areas of responsibility. While this operational strategy affords great empowerment for cutter and aircraft commanders, it is essentially the same tactical approach the service has followed for the past two hundred years. In a constrained budget environment and with the dramatic improvements in maritime and military technologies available, the Coast Guard can no longer afford to operate in the same manner as it did in its founding as the Revenue Cutter Service back in 1790.

The Coast Guard's solution is the Deepwater Project. Admiral Loy, the service's Commandant, has repeatedly emphasized that he wants the Project to be "bold and aggressive" because Deepwater is the future of the Coast Guard. The Project's system of systems will revolutionize not only the tools the Coast Guard has to perform its missions but also the service's culture. Consider the following illustrative description of potential Coast Guard assets under the Integrated Deepwater System concept.

Almost all Coast Guard missions first depend upon surveillance. Therefore, satellites could be used for broad surveillance coverage and long range unmanned air vehicles (UAV) launched from shore could provide more detailed images of specific areas of interest. In addition, cutter deployed UAVs could be used to extend the eyes of the ship, while manned aircraft would still be used for surveillance—particularly for search and rescue.

The different classes of manned aircraft could be reduced from the current four types to just two. A fixed wing aircraft, such as the four engine C-130 or the twin engine C-27, would provide long range response capability and a rotary wing aircraft would provide shipboard deployment capability. An intriguing alternative is the new Bell Textron 609 tiltrotor. The 609 is a smaller commercial version of the U.S. Marine Corps' V22 Osprey The 609 could provide both the long-range fixed wing capability and the deployable rotary wing capability in one aircraft. Any new aircraft must he quite capable of performing coastal and inland missions as well as those in deep water.

For surface capability the existing five classes of cutters could eventually be replaced by two classes—a large national security cutter (NSC) and an offshore patrol vessel (OPY). The NSC could be about 4,000 tons and approximately 400 feet in length. It must be capable of 30 + knots, able to defend itself in a low threat environment, and have a reduced radar cross-section.

The OPV could be about 500 tons and approximately 150 feet in length. The OPV may be able to deploy with manned or unmanned aircraft. This capability makes new multi-hull designs that offer greater topside space and improved stability such as SLICE, SWATH, catamarans or trimarans, very attractive.

The new surface platforms would be highly automated with very reliable systems, thereby reducing the need for large crews.

Linking these surface and air assets could be a robust satellite-based communications network. This network would provide the capability to transfer voice, data, and video information in both secure and unsecure modes. This comprehensive communications infrastructure would allow sharing of tactical information between all Coast Guard assets and facilities as well as provide deployed assets with real-time access to key operational databases.

In addition, training and logistics could leverage the service's improved interconnectivity as well. Computer-based maintenance procedures and training aboard the unit would reduce the need for crew absences to attend special schools. Cutter engineering and electronic plants could employ "smart machines" with micro embedded sensors that automatically monitor equipment status and condition. Automated shipboard systems could automatically provide a central shore-based support facility with plant status, operating hours, and casualty indicators. This information could automatically generate maintenance work lists for the cutter's next in port, order and pre-position necessary parts, and provide detailed maintenance procedures for support technicians.

The dramatic improvement in command, control, communications, computer, intelligence, surveillance and reconnaissance (C4ISR) and improved capabilities of surface and air assets could enable a total change from the platform-centric operational doctrine to network-centric. Cutters and aircraft would have the necessary equipment to serve as responsive components m a comprehensive operational network.

Rear Admiral Riutta, the head of Coast Guard operations, eagerly anticipates the arrival of the new Integrated Deepwater System. He refers to the Project as bringing the Coast Guard from the industrial age into the modern information age.

VALUE TO AMERICA'S FUTURE

Clearly, the Coast Guard has charted a course directly into an exciting yet challenging sea of change. However, the impact and benefits of the Deepwater Project extend well beyond the Coast Guard. An effective deepwater capability is a national asset that serves other government agencies, as well as all Americans.

The Project provides the right tools to improve the -~ Coast Guard's operational effectiveness and efficiency. It offers potentially substantial savings in operating and sup-port costs, and greatly improves the quality of work for Coast Guard sailors, which improves job satisfaction; that in turn improves sailor retention and recruitment.

The Deepwater Project delivers more capable assets for joint operations with the Department of Defense, other government agencies, and allied countries.

Most importantly, Deepwater benefits all Americans. More lives and property will be saved. There will be less drugs on our streets. Precious marine environments and resources will be more effectively safeguarded. And the Project stimulates employment opportunities for a host of key American industries.

Lieutenant Commander Michael Anderson *serves as the Communications Director for the Coast Guard's Deepwater Project. He has an extensive background in electronic systems with previous work experience including—lead electronics design engineer for the Coast Guard's new HEALY icebreaker supervisor of west coast shipboard electronics projects, and Commanding Officer of a regional electronics support command. LCDR Anderson holds a BS degree in electrical engineering from the Coast Guard Academy, MS degrees in electrical engineering and engineering management from Northeastern University, and recently received an MS in the management of technology from MIT.*

Diane Burton *is Surface Technical Director for the U.S. Coast Guard Deepwater Project. Previously she worked as a senior Naval Architect in the Hull Form and Hydrodynamics Division of the Naval Sea Systems Command. She has worked for several years on the hydrodynamics of a variety of ship classes with the U.S. Navy, U.S. Coast Guard, and NOAA. She was responsible for surface ship developments and small combatant stability updates, which include the following tasks: Hull Form Design System (HFDS) upgrades; Integrated Computation Design Environment Database development for NAVSEA's Hydrodynamics/Hydroacoustics Technology Center; Cooperative Research Navies international program for the development of dynamic stability criteria; and FFG/DDG class stability. She has a BSE and MSE from the University of Michigan in naval architecture and marine engineering, and is presently pursuing a masters of engineering management from George Washington University, specializing in systems engineering, technology insertion, and project management.*

Commander M. Steven Palmquist *is the Deepwater Project's Assistant Project Manager for C41SR. A Registered Professional Engineer, he received an MSEE from the Naval Postgraduate School in 1988. He*

did undergraduate work in naval architecture at the University of Michigan and is also a graduate of the National Test Pilot School's Avionics Testing course. An aviator, CDR Palmquist was twice selected as part of the Naval Helicopter Association's Rescue Aircrew of the Year.

Commander J. Michael Watson *has served in his current position as Deputy Project Manager of the Coast Guard's Deep-water Project since August1996. He has a broad milita7y background with operational tours on cutters Diligence in Florida and Storis in Alaska, and staff positions in Law Enforcement, Intelligence, and Acquisition. CDR Watson is a 1979 graduate of the U.S. Coast Guard Academy where he received BS in management. He earned an MS in management specializing in acquisition and contract management from the Naval Postgraduate School in 1991.*